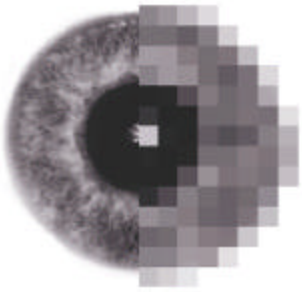
ADDENDUM
California Biomonitoring Needs Assessment

Report to the Advisory Committee
February 14, 2003



California
BIOMONITORING
Planning Project

A Project of the California Department of Health Services and Impact Assessment, Inc.

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Introduction

At the September 2002 Advisory Committee meeting, members asked staff to supplement the Project Needs Assessment with four items, which are collected in this Addendum:

A) Determine whether some California researchers may have been overlooked by the Researcher Survey (see Section 2 of the Needs Assessment). In particular, the Committee suggested that staff contact certain additional funding sources to learn whether they have supported relevant research here, check that none of those research projects was missed in conducting the survey and, if any were missed, ask if they would complete the survey.

B) Revisit the surveys of local health and environmental health officials, Tribal officials, non-governmental organizations and researchers with regard to their top concerns for exposures and emerging issues. The Committee was interested in whether looking at all of these together might elicit a different list of priorities than those from analyzing the surveys individually (see Sections 1 and 2 of the Needs Assessment).

C) Provide an overview of State of California programs that address environmental and occupational health concerns relevant to the Biomonitoring Planning Project, to assure that the Project is considering their work in the course of this planning effort.

D) Add to the Summary of Major Environmental Health Reports a summary of *America's Children and the Environment: A First View of Available Measures*, United States Environmental Protection Agency, 2000.

E) In addition, the Addendum includes new tables of the substances and health conditions of concern most cited by local and Tribal officials and non-governmental organizations, updated from those that appear in Section 1, pp. 11-12 of the Needs Assessment. These tables include surveys returned after the Needs Assessment survey analysis was prepared. The revised tables show some minor changes in the percentages of respondents who checked particular substances or health effects, but no overall change in the order of the items most frequently checked.

Section A.
Researcher Survey Report

During the summer of 2002, project staff identified potential collaborators in part through some major funders of environmental and occupational health research. At the Project's September 2002 Advisory Committee meeting, the Committee suggested several additional funders for staff to contact to help ensure that no potential collaborators had been overlooked.

The additional funders included:

- Tobacco-Related Disease Research Program (TRDRP)
- National Institute for Occupational Safety and Health (NIOSH)
- California Health Care Foundation
- California Endowment Foundation
- California Wellness Foundation.
- Breast Cancer Fund

Twenty prospective respondents were identified and sent the researcher survey by e-mail; three responded. Among the three responses, only one of the projects described is potentially relevant to biomonitoring capacity expansion efforts. That project, entitled "Genetic Epidemiology of Cardiovascular Disease and Healthy Aging," focuses on genetic susceptibility biomarkers associated with early onset of coronary disease among the elderly population in the Kaiser-Permanente health care system. Human tissues are collected with the intended purpose of testing for genetic variants. The investigator indicated no current interest in expanding the study to include biomonitoring components.

This supplemental search for potential collaborators provides the Biomonitoring Planning Project with added assurance that potential collaborators have been identified.

Section B.
Cross-Analysis of Survey Results

After reviewing results from the surveys of local and tribal officials (TOs), non-governmental organizations (NGOs) and researchers, the Advisory Committee suggested exploring what overarching concerns were shared among all the different groups of respondents. The Committee was particularly interested in looking at both the quantitative and qualitative answers to questions about emerging issues and substances, exposures and health effects of concern.

To conduct this new analysis, responses were extracted from the surveys of local and tribal officials and NGOs for top exposure concerns they are working on and for the qualitative questions about sources of exposure and emerging concerns. (It is noteworthy that the local health officials and environmental health officers did not list any exposures as an emerging concern.) From the researcher surveys, qualitative answers for "toxic substances which should be biomonitored" were extracted. Comparisons were made among all these responses to look for overlapping concerns for exposures. The results are discussed below.

Four overarching issues emerged from the analysis. Each is broad and includes a host of specific toxic substances for which exposure assessment is needed, for both health research and policy development.

Pesticides

Pesticides are an overarching concern that transcends the different groups. NGOs/TOs (43%) and local health and environmental health officers (59%) listed pesticides among their top exposure concerns in both home and agricultural use. It is described as a current (rather than emerging) concern. Pesticides use near schools (and hence near children) is of particular interest. As for the researchers, several mentioned the need to have pesticides biomonitored and more lab methods developed for detecting the numerous types of pesticides. Among all researchers who participated, pesticides are the most frequent topic of study: twelve of the 34 studies we identified through the researcher surveys delve into the health effects of pesticides.

Air Pollution

Exposure to air pollutants, including indoor air quality, is another overarching concern for our respondents. They repeatedly raise concern about the wide exposure to air pollution and its effects on asthma and other health conditions. Particulate matter was listed among the top five exposures that NGOs and tribal officials (TOs) are working on (19%), while volatile organic compounds (14%), carbon monoxide (7%) and diesel (5%) were also mentioned. The local health and environmental health officers expressed the same concern by ranking particulate matter among their top five exposures of concern (26%). They also listed volatile organic compounds (15%) and ozone (11%) as top

exposures of concern. Researchers suggested that more methods development is needed to improve exposure assessment for air pollution, especially to find a valid and reliable biomarker of exposure. Six of the 34 research projects identified in the researcher survey focus on air pollution and its health impacts. While all of the substances and exposures listed above could be considered as part of "air pollution," the main pollutants of concern to respondents are particulate matter and traffic exhaust.

Food and Mercury

Contaminated food is a top exposure concern among both NGOs/TOs and local officials. While food is discussed broadly in these responses, some made reference to mercury-laden fish, consumed in high volume by particular ethnic groups. Mercury is the second highest exposure of concern for NGOs/TOs (24%) and the sixth for local officials (15%). Food and mercury also surfaced as *emerging* concerns for the NGOs/TOs. Researchers, too, noted mercury and heavy metals (of which mercury is one) as toxic substances which should be biomonitored. One of the research studies directs its attention to mercury, although not mercury in food. Mercury is a substance of concern for all the groups of respondents, from food as well as other sources.

Drinking Water Contamination and By-products

Drinking water is another source of exposure of concern to the NGOs/TOs and local officials. Many of them raised it as a concern, for either or both contaminated drinking water and by-products resulting from disinfection. NGOs/TOs listed drinking water disinfection by-products as among their top exposures of concern (14%) as did some local health officers (7%). No researchers raised this as a top priority exposure that should be biomonitored, although three research projects focus on drinking water issues.

Section C.
Summary: *America's Children and the Environment: A First View of Available Measures*

America's Children and the Environment: A First View of Available Measures
Authors: United States Environmental Protection Agency
Office of Children's Health Protection and Office of Policy, Economics and Innovation
Date: December 2000

Summary: *America's Children and the Environment: A First View of Available Measures* is USEPA's first report on trends in measures reflecting environmental factors which may affect the health and well-being of children in the United States. It is an initial step in the identification, development and compilation of measures that fully reflect environmental factors important for children. The report has two principle objectives. The first is to present quantifiable measures of environmental factors that can be monitored over time to demonstrate trends and point to further investigation of others. The second is to provide a starting point for discussions among policy makers and the public about how to improve federal data on children and the environment. **The first section presents measures reflecting trends in levels of environmental contaminants** likely to affect children's health. The measures are intended to show the percentage of children exposed to particular contaminants in air, water, food and soil. **The second section focuses on biomonitoring** and presents measures that reflect trends in the concentration of lead in children's bodies. This is the only contaminant for which there is adequate biomonitoring data available at this time. Future reports will integrate new information on biomonitoring trends as the information becomes available through ongoing research efforts. **The third section presents measures that reflect trends in certain diseases**, the frequency or severity of which may be related to environmental factors. Measures include respiratory disease (asthma and chronic bronchitis) and childhood cancers, and were selected based on importance to the health of children, availability of data for much or all of the United States, and sufficient quality of data to generate a reliable measure.

Some key findings in the report include:

- The percentage of children living in counties where one or more of the six criteria air pollutants exceeded national air quality standards decreased from 28% to 24% from 1990 to 1998.
- In 1990, 100% of children lived in counties in which a 1-in-100,000 benchmark for cancer risk was exceeded by at least one hazardous air pollutant. In the same year, 6% of children lived in counties in which a 1-in-10,000 benchmark for cancer risk was exceeded by at least one hazardous air pollutant.
- The percentage of children under 7 in homes where someone regularly smokes decreased from 29% in 1994 to 19% in 1999.

- Between 1993 and 1998, the percentage of children living in areas served by public water systems in which a drinking water standard for chemicals, radiation or microbials was exceeded decreased from 19% to 8%. For the same time period, the number of children served by water systems that exceeded nitrate water standards decreased by 20%.
- Of the fruits, dairy, grains and processed food tested by USDA's Pesticide Data Program, 62% showed detectable levels of pesticide residue in 1994 and 55% showed the same in 1998.
- Average concentrations of lead in blood of children age 5 and under dropped from 16.5 micrograms per deciliter in 1976-1980 to 3.6 in 1992-1994. However, between 1992-1994, 1.5 million children under 17 had elevated blood leads (over 10 micrograms per deciliter).
- The prevalence of asthma among children in the United States increased 75% between 1980 and 1994. In 1997-1998, 8.3% of non-Hispanic Black children living in families below the poverty line had asthma, the highest for all racial groups and income levels.
- The frequency of childhood cancer has increased from 130 cases per million children in 1975 to 150 cases per million in 1995. The frequency of death from childhood cancer has decreased due to improvements in treatment.

Relevance: This report is the initial step toward the development of a framework for a national tracking effort that focuses on the environmental factors important for children's health. Biomonitoring is perceived as an important element in this effort. The need for data on concentrations of contaminants in children's bodies in addition to lead is highlighted in the future directions section of the report. The report summarizes information on particular environmental measures that can be used to track trends, proposes a framework for their use, and lays the foundation of information about historical trends related to the measures. The need for more specific data in a variety of areas is discussed, as well as the implications of the information for use in policy development.

Section D.
Substances and Health Conditions of Concern
(Revised Tables 1 and 2)

Subsequent to preparation of the Needs Assessment, 10 surveys were returned by local and Tribal officials and non-governmental organizations. Below are Needs Assessment Tables 1 and 2 updated to reflect all the surveys we received. They show some minor changes in the percentages of respondents who checked particular substances or health effects, but no overall change in the order of the items most frequently checked.

Table 1. Substances of Concern Most Cited by California Local Officials and Tribal and Non-Governmental Organizations *

Local Officials (N=31)	**Tribal and Non-Governmental Organizations** (N=48)
Lead (64%)	Pesticides (42%)**
Pesticides (61%)	Mercury (25%)
Environmental tobacco smoke (43%)	Persistent organochlorines (23%)
MTBE (32%)	Lead (23%)
Particulate matter (25%)	Particulate matter (19%)
Volatile organic compounds (18%)	Environmental tobacco smoke (15%) Arsenic (15%) Asbestos (15%) Phthalates (15%)
Mercury (14%) Persistent organochlorines (14%)	Volatile organic compounds (13%)
Asbestos (11%) Ozone (11%)	Ozone (10%)

* Total exceeds 100% because respondents listed the top three substances.

** There is a potential underestimate for pesticides, as some respondents may have checked "persistent organochlorines" when their concern is a pesticide.

Table 2. Health Conditions of Concern Most Cited by California Local Officials and Tribal and Non-Governmental Organizations*

Local Officials (N=27)	**Tribal and Non-Governmental Organizations** (N=32)
Respiratory disorders (100%)	Cancer (68%)
Cancer (89%)	Respiratory disorders (42%)
Cardiovascular disease (48%)**	Developmental disabilities (29%)
Developmental disabilities (33%)	Endocrine disorders (32%)***

* Total exceeds 100% because respondents listed their top three substances.
** Cardiovascular disease was listed by 2 TOs/NGOs (6%).
*** Endocrine disorders was listed by 1 local official (4%).

Section E.
Overview of State of California Programs Relevant to the Biomonitoring Planning Project

Expansion of California's State laboratory capacity to include biomonitoring requires coordination among State environmental and occupational health programs. Four programs are described below. Three of these programs are represented on the Advisory Committee, and the fourth (the Childhood Lead Poisoning Prevention Branch) was consulted regarding the Biomonitoring Project.

Childhood Lead Poisoning Prevention Branch (CLPPB), California Department of Health Services

The mission of the Childhood Lead Poisoning Prevention Branch is to eliminate childhood lead poisoning by identifying and caring for lead-burdened children, and preventing environmental exposures to lead. The branch goals are:

- An informed public able to protect children from lead exposures;
- Well-supported, effective local programs to detect, manage and prevent childhood lead poisoning;
- Fully developed capacity to track lead exposure statewide and to monitor the management of lead-burdened children;
- Strong infrastructure and to prevent children's exposure to lead through partnerships with government agencies, community-based organizations, and the private sector;
- Full compliance with Federal and State statutory and regulatory requirements; and
- Continued state and national leadership through research, policy development and standard setting.

CLPPB is involved in many different projects to advance towards these goals. As of January 1, 2003, all blood lead test results (regardless of level) are reported to the Branch, CLPPB maintains a lead poisoning database for statewide surveillance and identifies children with high blood lead levels so that appropriate health and exposure assessments can be done. The Branch's work is accomplished in partnership with childhood lead poisoning prevention programs in local health jurisdictions. Contract funds are currently given to 46 local jurisdictions for lead poisoning activities.

CLPPB works with many other partners as well, including, for example, the Department of Health Services Environmental Health Laboratory Branch and non-laboratory partners such as the Center for Health Analysis of Mothers and Children of Salinas (CHAMACOS) to test for lead levels in cord blood.

The California Lead Related Construction Program, which receives EPA funding, is part of the CLPPB. This program conducts activities to see that individuals participating in lead-related construction have lead-appropriate training and follow safe-work practices.

CLPPB's work includes cooperating with other programs in the California Department of Health Services (CDHS) to assure that children and families "at risk" for lead poisoning receive anticipatory preventive guidance and required lead testing. These programs include Medi-Cal, Women, Infant and Children (WIC), and Child Health and Disability Prevention.

Environmental Health Investigations Branch (EHIB), California Department of Health Services

The mission of the Environmental Health Investigations Branch is to protect the health of Californians by assessing the association between health outcomes and the environment, and collaborating with communities to addresses their environmental health concerns. . EHIB activities include health assessments; exposure investigations; health and exposure surveillance; public health oversight; technical assistance and training; community involvement, health outreach and education; and formulation of policy initiatives and recommendations.

Branch projects focus on a wide range of issues. Some projects address exposure to specific environmental contaminants. These contaminants include:

- Pesticides;
- Indoor air quality contaminants (e.g., fungal contamination and asthma triggers);
- Dioxins;
- Fish and shellfish contaminants (e.g., mercury, PCBs);
- Metals (e.g., arsenic, mercury, chromium);
- Hazardous air pollutants ;
- Arsenic-treated wood;
- Contaminants at hazardous waste sites (e.g., perchlorate, TCE, PCE);
- Methane;
- Contaminants related to emergency incidents (e.g., a sulfuric acid release in Richmond, a Catacarb release in Rodeo, a train derailment and pesticide spill in Dunsmuir, other transportation accidents, nuclear power plant accidents, and bioterrorism);
- Electromagnetic fields (EMFs); and
- Drinking water contaminants (e.g., nitrates, TCE, PCE, arsenic, trihalomethanes).

Other EHIB projects focus on health effects that may be associated with environmental exposures. These include: asthma, cancer (particularly breast, testicular, and childhood cancer), reproductive health outcomes (such as menarche onset, hormonal effects, and sperm quality), and developmental disabilities, specifically autism.

EHIB is also implementing projects that deal with environmental justice issues and environmental health tracking. The Environmental Health Tracking Project began in 2002 under a State mandate to establish a system for tracking chronic diseases and environmental exposures. More specifically, the federally-funded project aims to expand the State's capacity to monitor trends in health conditions, such as asthma, reproductive health outcomes, neurodevelopmental disabilities, and neurological disorders, and exposure to chemicals in the environment.

Occupational Health Branch (OHB), California Department of Health Services

The Occupational Health Branch (OHB) is a statewide, non-regulatory program whose aim is to promote a safe and healthful work environment for all Californians through a comprehensive and effective program of prevention activities, public health leadership, scientific excellence and collaboration with stakeholders. OHB's approach to preventing work-related injury and illness may be summarized as a three-fold process:

1) identifying, evaluating and disseminating information about workplace hazards, and who is getting sick or injured, and how;
2) 2) working with partners in industry, labor and the community to develop safer ways to work; and
3) 3) providing education and technical assistance that is essential for others to use to promote worker health and safety.

OHB has over 60 professional and support staff in the fields of occupational medicine, epidemiology, industrial hygiene, safety, health education and toxicology. OHB has staff who are bilingual in Spanish and Cantonese, and are essential for conducting work site investigations and developing multilingual educational materials. The Branch is comprised of three sections, described as follows.

The Hazard Evaluation and Information Service (HESIS), established in 1979, maintains a statewide helpline and a comprehensive repository of information on a broad array of occupational health hazards; identifies and evaluates new workplace hazards; provides technical information to the public as well as occupational health professionals; develops educational materials such as fact sheets, hazard alerts, and medical guidelines; conducts field investigations in consultation to the Cal/OSHA Medical Unit ; and recommends health and safety standards to Cal/OSHA. HESIS staff respond to approximately 350 requests annually on over 500 chemical agents, and disseminate over 10,000 publications each year on diverse hazards such as ergonomics, molds, and solvents.

The Occupational Health Surveillance and Evaluation Program (OHSEP), established in 1986, conducts surveillance and investigation of work-related injuries and illnesses; provides technical assistance to employers, employees and occupational safety and health professionals; conducts case-based and in-depth epidemiological investigations to determine the causes of workplace injury and illness; and makes recommendations for prevention through reports and scientific publications. Surveillance databases are

maintained for tracking work-related pesticide illness, asthma, carpal tunnel syndrome, silicosis, construction falls, and fatalities.

The Occupational Lead Poisoning Prevention Program (OLPPP), established in 1991, maintains the Occupational Blood Lead Registry (a system to track workers with elevated blood lead levels); investigates reported cases of occupational and take-home lead poisoning; analyzes data to identify patterns of lead poisoning; provides outreach, education, training and technical assistance to workers, employers, health professionals and others; develops and disseminates educational materials; conducts industrial hygiene research; and designs, conducts, and evaluates public health intervention projects aimed at specific industries, occupations, and other high-risk groups.

Office of Environmental Health Hazard Assessment (OEHHA), California Environmental Protection Agency

OEHHA's mission is to protect and enhance public health and the environment through scientific evaluation of risks posed by hazardous substances. It provides state and local government agencies with toxicological and medical information relevant to decisions involving public health. Furthermore, OEHHA works with federal agencies, the scientific community, industry and the general public on a wide variety of issues in environmental and public health.

OEHHA is currently working on a multitude of environmental exposure issues. Current projects include evaluation of exposures and health effects of environmental contaminants including pesticides. OEHHA is involved with pesticide issues, ranging from toxicology to health and safety regulations for pesticide workers. One program, for example, measures cholinesterase inhibition in workers. Another OEHHA program develops public health goals for drinking water contaminants, which provide the public health basis for promulgation of maximum contaminant levels. OEHHA also has a program that assesses risks of chemical contaminants in fish and is involved in issuing sport fish consumption advisories.

In addition, OEHHA is involved with air pollution, through conducting risk assessments and making recommendations to the Air Resource Board. Under state mandate, OEHHA specifically evaluate hazards to children. The department also conducts epidemiological evaluations of air pollutants. Lastly, other projects include risk assessments related to contaminated waste sites and U.S.-Mexico border health.

OEHHA operates several programs that target health outcomes such as cancer and reproductive and developmental health in relation to environmental exposures, with a focus on toxicology. The staff conducts cancer evaluation assessments for the development of criteria to identify carcinogens to children and incorporate considerations of age-at-exposure into cancer risk assessments.

OEHHA is developing a multimedia analysis process for helping the Air Resources Board evaluate new fuels proposed for use in California. They are also developing guidance to be used by the Department of Toxic Substances Control (DTSC) for assessing health risks at existing or future school sites that may be contaminated with hazardous chemicals. Staff are also working closely with DTSC on development of guidance for the assessment and remediation of structures used as clandestine drug laboratories. Staff provide consultative services to the Regional Water Quality Control Boards (RWQCB) on health risks from exposure to hazardous materials at contaminated sites for which RWQCB staff are overseeing cleanups. OEHHA staff provide similar consultative services to the Integrated Waste Management Board and provide input on a number of Board projects.

In addition to these projects, OEHHA hosts the Cal/EPA Environmental Protection Indicators for California Program, in which all the Cal/EPA boards and departments, the Resources Agency and other state agencies provide input towards developing and maintaining measures of environmental health. OEHHA also participates in the Cal/EPA California/Baja California Border Coordinator Program where staff assist in addressing human and environmental health issues along our common border.